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Structural Analysis of Atypical Protein Kinase, ChaK

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ABSTRACT: Transient receptor potential (TRP) channels modulate calcium levels in eukaryotic cells in response to external signals. A newly discovered TRP channel has the ability to phosphorylate itself and other proteins on serine and threonine residues. The catalytic domain of this channel kinase (ChaK) has no detectable sequence similarity to classical eukaryotic protein kinases, and is essential for channel function. The structure of the kinase domain, reported here, reveals unexpected similarity to eukaryotic protein kinases in the catalytic core, as well as to metabolic enzymes with ATP-grasp domains. The inclusion of the ChaK catalytic domain within the eukaryotic protein kinase superfamily indicates a significantly wider distribution for this group of signaling proteins that suggested previously by sequence comparisons alone.